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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/719,116	04/09/2001	Abdallah Lyoussi	33126	5138

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EXAMINER

PALABRICA, RICARDO J

ART UNIT	PAPER NUMBER
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3641

DATE MAILED: 12/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/719,116

Applicant(s)

LYOUSSI ET AL.

Examiner

Rick Palabrica

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4 and 6-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4 and 6-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

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DETAILED ACTION

1. Applicant's Request for Continued Examination in paper No. 16 and Amendment in Paper No. 17 are acknowledged. Said Amendment cancels claims 1-3 and 5, directly revises claims 4 and 6, and adds new claims 11-14.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 4 and 6-14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The previous claim 4 recites "means of irradiating the object by a neutron flux consisting of thermal, epithermal and fast neutrons." The amended claim 4 now recites, "means for irradiating the object by generating a sequence of initial fast neutron pulses which comprises a neutron flux consisting of thermal, epithermal and fast neutrons." Underlining provided. Note that the previous claim irradiates the waste package by a neutron flux. The new claim 4 irradiates by a different means, i.e., by generating fast

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neutron pulses. Also, these pulses may include more than just a neutron flux (e.g., gamma flux) because of the inclusive, open-ended transitional term "comprising". This term is synonymous with "including", "containing", or "characterized by", and does not exclude additional, unrecited elements. See, e.g., MPEP 2111.03 and *Genentech, Inc. v. Chiron Corp.*, 112 F.3d 495, 501, 42 USPQ2d 1608, 1613 (Fed. Cir. 1997) ("Comprising" is a term of art used in claim language which means that the named elements are essential, but other elements may be added and still form a construct within the scope of the claim).

3. Claims 4 and 6-14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 4 recites the limitation, "means for generating a sequence of initial fast neutron pulses which comprises a neutron flux consisting of thermal, epithermal and fast neutrons." Underlining provided. There is neither an adequate description nor enabling disclosure as to how and in what manner fast neutron pulses can include lower energy neutrons, i.e., thermal and epithermal neutrons.

Claim 4 recites the limitation, "said means of thermalizing being capable of providing said neutron flux consisting of thermal, epithermal and fast neutrons." Underlining provided. A neutron thermalizing means is known in the nuclear art as an

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element or apparatus to slow down a fast or epithermal neutron of high energy to thermal energy (e.g. from 1 Mev to .025 ev). There is neither an adequate description nor enabling disclosure as to how and in what manner said thermalizing means provides epithermal and fast neutrons.

Claim 4 recites the limitation, "means for determining the quantity of each of the M+N isotopes from Sp and Sr and from at least M+N-2 additional items of information related to the quantities of the M+N isotopes." Underlining provided. The term "at least" means one or more. The specification on page 5 discloses only one example of such additional information, i.e., correlation between the quantities of M+N isotopes. There is neither an adequate description nor enabling disclosure as to what the other additional information are, and how and in what manner they should be combined to achieve the desired result. Combining different types and/or sets of so-called additional information may not yield the same results.

Claim 11 recites the limitation, "a thickness of neutron multiplier material being provided at least between the central area and the neutron source." Underlining provided. The term "at least" means one or more. The disclosure only describes the neutron multiplier being disposed at only one location, i.e., between the central area and the neutron source (e.g., see Fig. 3). There is neither an adequate description nor enabling disclosure as to where else said multiplier can be located. Combining different numbers and locations of such multiplier may not yield the same results.

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4. Claims 4 and 6-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims are vague and indefinite, and their metes and bounds cannot be determined for the same reasons as those given in sections 3 and 4 above.

Claim 4 recites the limitation "the last pulse" in line 30. There is insufficient antecedent basis for this limitation in the claim.

Claim 4 recites the limitation "all signals" in line 31. There is insufficient antecedent basis for this limitation in the claim.

Claim 4 recites the limitations "these quantities" and "the coefficients" in line 42. There are insufficient antecedent bases for these limitations in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 4, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caldwell et al. (U.S. 4,497,768) in view of either one of Allen et al. (Nuclear Technology, Vol. 47, Feb. 1980) or Caldwell et al. (U.S. 4,483,816). Caldwell et al.

('768) disclose the applicant's claims except for the isotopic determination of the fissile and fertile elements.

Caldwell et al. ('768) disclose an apparatus and method for quantitatively evaluating total fissile and fertile nuclide content in a radioactive waste sample, based on prompt and delayed neutron measurements. Their apparatus (e.g., see Fig. 1) includes a source of fast neutrons operating in a pulsed mode, i.e., photo neutron source (4), and a photon source. Note that Applicant's claim language for characterizing the elements of his apparatus recites the inclusive, open-ended transitional term "comprising", which is synonymous with "including", "containing", or "characterized by", and does not exclude additional, unrecited elements. Therefore, the claim language does not preclude having another radiation source, e.g., a pulsed photon source, in addition to a neutron source, as in Caldwell et al. ('768).

They disclose a means for thermalizing fast neutrons, i.e., polyethylene enclosure (8), a means for counting prompt and delayed neutron signals, i.e., neutron detectors (12, 23) and signal processing means (14). This signal processing means is capable accumulating a plurality of prompt and delayed neutron emission measurements, as in the claimed invention.

They also disclose in Table 1 the isotopes in the sample that can be detected, including the claimed fissile isotopes, i.e., uranium-233, uranium 235 and plutonium 239, and the fertile isotope, uranium 238.

As to the claim language "sequence of fast neutron pulses which comprises a neutron flux consisting of thermal, epithermal and fast neutrons", the Examiner

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interprets this as follows: neutrons emitted by the pulsed neutron source create fissions in the waste package, these fissions generate fast neutrons and some of them are slowed down in the moderator to epithermal and thermal energies, thus providing a neutron flux of thermal, epithermal and fast neutrons. This neutron flux is generated by the apparatus of Caldwell et al. ('768).

Either one of Allen et al. or Caldwell et al. ('816) disclose algorithms for determining the isotopic concentration of isotopes based on prompt and delayed neutron measurements, as well as how to determine calibration constants required for such isotopic determination. Both Allen et al. or Caldwell et al. ('816) teach that their method provides a sensitive, non-destructive assay technique for isotopic determination. Note that the claim language does not preclude the elements of the processing means from either being performed separately and/or manually. Therefore, the processing means can be partly electronic and partly by hand, for as long as the desired processing output is obtained. For example, performing the isotopic determination manually using algorithms or equations is not precluded by the claim language

One having ordinary skill in the art would have recognized that all three references are in the same field of endeavor, i.e., nuclear assay based on prompt and delayed neutron measurements. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus, as disclosed by Caldwell et al. ('768), by the teaching of either Allen et al. or Caldwell et al. ('816), to determine the isotopic concentration of fissile and fertile isotopes by an

appropriate algorithm that uses information on the isotopes, e.g., from the prompt and delayed neutron data, to gain the advantages thereof (i.e., sensitive, non-destructive assay method), because such modification is no more than the use of well known techniques of isotopic concentration determination within the nuclear art.

6. Claims 6-11 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caldwell et al. ('768) in view of the combination of Caldwell et al. ('816) and Maniscalco et al. (U.S. 4,344,911). Caldwell et al. ('768) disclose the applicant's claims except for the use of a neutron multiplier material, three neutron detectors and rotation of the package.

Caldwell ('816) teaches a containment that includes a central area in which the object to be assayed is placed and rotated (see Fig. 1). Neutron counting means (helium-3 detectors) are placed on all sides between the central area and the thickness of moderator material. These detectors are surrounded by a thickness of neutron absorber (cadmium) and moderator material (polyethylene).

Maniscalco et al. teaches that lead is a good neutron multiplier because of its high (n, 2n) cross section and low capture cross section (see column 6, lines 2+). One having ordinary skill in the art would have recognized the advantage of using a neutron multiplier to increase the yield of neutrons from a fast neutron source, and to use such multiplier in an assay apparatus using a neutron generator would have been prima facie obvious.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Caldwell ('768) by the

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teachings of the combination of Caldwell ('816) and Maniscalco et al., in order to have the package rotated for uniform irradiation, to have the neutron counting means on three sides of the containment for more accurate counting, and have a thickness of neutron multiplier material to generate higher neutron flux, because such modification is no more than the use of well-known expedients in the nuclear art.

For the benefit of the applicant, Lasche (U.S. 4,735,762) also teaches the use of lead as a neutron multiplier.

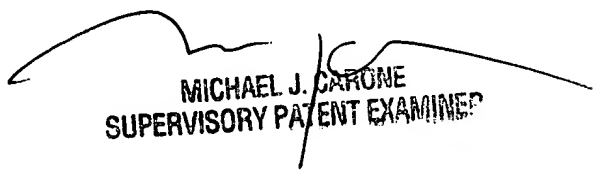
Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rick Palabrica whose telephone number is 703-306-5756. The examiner can normally be reached on 7:00-4:30, Mon-Fri; 1st Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Carone can be reached on 703-306-4198. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.

RJP
December 4, 2003


MICHAEL J. CARONE
SUPERVISORY PATENT EXAMINER